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ABSTRACT

This workbook presents materials for a Nontraditional Options Workshop designed to introduce women to predominantly male vocational programs and careers. The workshop provides career awareness, vocational information, and hands-on exploration of nontraditional programs offered at Blackhawk Technical College (BTC), Wisconsin. Introductory materials include information on the sex equity project, gender equity, and gender equity legislation in vocational education; an introduction to BTC; and an introduction to sex equity, including 11 handouts/resources. Materials for the three components of the 36-hour workshop follow. The survey component introduces technical concepts and skills, such as print reading, basic electricity, measurements, and tool usage. Materials provided include an overview, objectives, goals of the survey, a course outline, descriptions of five sessions, and handouts. The math component (which includes an instructor's guide for a six-session workshop) assesses current math skills, teaches math concepts and practical applications of math, and helps participants to understand math anxiety. In addition, this section contains an attitude survey; information on math anxiety; suggestions for studying math, real-life math problems; a narrative and problems on fractions, word problems, percents, and calculators; and an answer key. An experiential nontraditional component provides hands-on exploration of nontraditional programs at BTC. Instructional materials include program descriptions with responsibilities, job potential, and related jobs. Workshop activities are suggested. (YLB)

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Nontraditional Options Workshop 1990

Participants Workbook

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NONTRADITIONAL OPTIONS

WORKSHOP

Compiled By

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Beth Ann Pierce
Sex Equity Coordinator

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NONTRADITIONAL OPTIONS WORKSHOPS

Nontraditional Options Workshops are provided by the Sex Equity Project for the purpose of introducing women into vocational programs and careers that are dominated by men. Male dominated careers often provide the opportunities for higher salaries, better advancement opportunities and benefits, and greater job satisfaction (Changing Roles of Men and Women, 1989).

This workshop seeks to provide career awareness, vocational information and hands-on exploration of nontraditional programs offered at Blackhawk Technical College, in order to assist participants in making more informed and confident career decisions. Each thirty-six hour workshop includes a survey component (which introduces technical concepts and skills such as print reading, basic electricity, measurements, and tool usage); a math component (which assesses current math skills, teaches math concepts and practical applications of math, and helps participants to understand math anxiety); and an experiential nontraditional component (which provides hands on exploration of programs which are considered nontraditional at BTC; i.e., programs which enroll less than 25% women). These include programs in the divisions of Agriculture,

Industrial Occupations, and Service Occupations (e.g. welding, electro-mechanical technology, mechanical design, etc.) N.T. workshops are offered four times per year (Oct - Dec - Feb - Apr).

SEX EQUITY PROJECT

Nontraditional workshops are just one component of the BTC Sex Equity Project. The Sex Equity Project, which is funded by the Vocational Education Act and the local VTAE district, provides many activities which seek to reduce gender bias and stereotyping, increase nontraditional enrollments, and maintain gender equity in vocational education. The Sex Equity Project at BTC has been recognized by the WBVTAE as the best project in the state for 1988-1989. This was the second consecutive year that BTC has been awarded this honor. Activities of our project at BTC include:

NTO Workshops	**(4-36 hour workshops per year)**
Pre-Electronics Workshops	**(2-36 hour workshops per year)**
Pre-Tech Math	**(1-36 hour workshop per semester)**

Career Awareness Workshops	**(1 day nontraditional experience)**
Support Groups	**(individual and group support for nontraditional students)**
Nontraditional Presentations	**(Information on Nontraditional Programs and Sex Equity classes to campus and community groups)**
Mentoring	**(Nontraditional students provides shadowing experiences for women interested in exploring nontraditional programs)**

Please contact the Sex Equity Coordinator (757-7752) for more information about these activities.

GENDER EQUITY

According to the Vocational Equity Center, "Gender equity is freedom from favoritism based on gender. The achievement of gender equity enables both women and men of all races and ethnic backgrounds to develop skills needed in the home and in the paid labor force, which are best suited to an individual's interests and abilities. It opens up economic, social and political opportunities for all people, and it fosters mutual trust, as persons of both sexes are unrestricted in their roles.

Gender equity activities are deliberate efforts to build partnership skills, enhance people's ability to work together productively, build stable and satisfying family relationships, expand career opportunities, achieve economic and political equity, and eliminate gender bias, sex role stereotyping and discrimination on the basis of gender." (Changing Roles curriculum, 1989).

GENDER EQUITY LEGISLATION IN VOCATIONAL EDUCATION

Title IX of the Education Amendments of 1972 prohibits discrimination on the basis of sex in programs and activities receiving federal financial assistance.

Title II of the Education Amendments of 1976 requires vocational educators to take active positive steps to eliminate sex bias and sex stereotyping in vocational education programs. The Division of Vocational Education in the U.S. Department of Education provides staff, technical assistance, and resources to vocational educators in achieving equity in programs, policies and procedures.

The Carl D. Perkins Vocational Education Act (Public Law 98-524) requires states to report annually on enrollments in vocational education programs to measure change in nontraditional enrollments.

NONTRADITIONAL WORKSHOP

Course Overview

Title: Career Decisions III (862 331)

Course Time: 9 a.m. - 3 p.m. Tuesday/Thursday

Contents:
1) Introduction to BTC - 1 hr
2) Introduction to Sex Equity - 2 hr
3) Survey Component - 9 hrs
4) Math Component - 12 hrs
5) Nontraditional Exploration - 12 hrs

INTRODUCTION TO BTC

A description of BTC nontraditional programs along with female enrollment data, is provided to participants (See Table I). This information includes current statistics on numbers of women enrolled in each program. In addition, participants can ask questions about: applying for financial aid, registering for classes, programs that have waiting lists, the differences between vocational and associate degree programs, the job potential of various programs, etc. Participants can learn about other services at BTC (e.g. learning lab, PALS, counseling, childcare, tutorial, etc.) and will receive a tour of the facilities with special emphasis on nontraditional classrooms and shops.

Table I

INDUSTRIAL OCCUPATIONS DIVISION

One Year Vocational Diploma Programs

Auto Body - 1 out of 18 are females: 5.5%

Auto Servicing - 4 out of 22 are female: 18%

Business Equipment Service Technician - 3 out of 9 are female: 33%

Electric Power Distribution (0% Female)

Machine maintenance - 3 out of 20 are female: 15%

Machine Tool Operator - 10 out of 24 are female: 42%

Welding - 5 out of 28 are females: 18%

Two Year Associate Degree Programs

Aircraft Electronics - 6 out of 27 are females: 22%

Airframe & PowerPlant Mechanics (0% Female)

Auto mechanics (0% Female)

Electro-mechanical Technician - 1 out of 27 are female: 3.7%

Electronic Technician - 6 out of 40 are female: 15%

Industrial Engineering Technician - 1 out of 26 are female:3.8%

Mechanical Design - 21 out of 55 are female: 38%

Table I (cont.)

AGRICULTURE

ONE YEAR VOCATIONAL DIPLOMA PROGRAM

Truck Mechanic (0% Female)

Agriculture Equipment Mechanic (0% Female)

Diesel and Heavy Equip. Mech. - 1 out of 13 are female: 77%

SERVICE OCCUPATIONS

Two Year Associate Degree Program

Fire Science - 1 out of 39 are female: 2.5%

Police Science - 52 out of 108 are female: 48%

APPRENTICESHIP PROGRAMS

Carpentry (construction) (0% Female)

Electrician apprenticeship (0% Female)

Machinist/Tool and Die apprenticeship (0% Female)

Steamfitter apprenticeship (0% Female)

Plumber apprenticeship (0% Female)

INTRODUCTION TO SEX EQUITY

Information will be shared with participants on gender stereotyping and bias, and how it affects participation and success in education and employment. Participants will have the opportunity to enhance their awareness of gender equity issues and personal biases through group activities and discussion. Topics will include: wage disparities; advantages and disadvantages of nontraditional employment; stereotyping/bias; career decision making.

Hand-Outs/Resources Included in the following Pages

(From Changing Roles Curriculum, 1989)

1. "The Changing Roles of Men and Women"
2. "Sex-Role Expectations"
3. "Gender Communications Quiz"
4. "Equity Terms"
5. "Differentiate Between Bias and Discrimination"
6. "Women Get A Raise - From 59 Cents to 64 Cents"
7. "Why Sex Equity?"
8. "Advantages of Nontraditional Jobs"
9. "Factors Deterring Women from Entering Non-Traditional Careers"
10. "Some Nontraditional Job Opportunities for Women"
11. "The Bottom Line: Nontraditional Jobs"

THE CHANGING ROLES OF MEN AND WOMEN:

IMPLICATIONS FOR VOCATIONAL EDUCATION

Society is changing so rapidly that some of our most sacred of traditions are less and less helpful as we face today's challenges and look forward to tomorrow's opportunities.

The rigid roles we have expected of men and women, for example, are becoming less compatible with the economic and social realities of the 1980's and 1990's. They limit people's ability to reach their full potential, and the nation's ability to tap the best talent available. The basis for sex role expectations in the work place is crumbling under the impact of new technologies and job requirements.

Roles within the family are also changing. For example, women accounted for 60% of the increase in the civilian labor force in the last decade. Today only 4% of all American families consist of a husband-breadwinner, wife-homemaker and two children. In 1985, nearly half of all mothers with preschool children were in the labor force. In 1985, the number of husband-wife families with males as the breadwinner decreased, and the number with female breadwinners increased. Since 1981, wives earned more than their husbands in 16% of dual earner couples. Fifty-five percent of these couples had no children present in the home. Thirty-three percent of these secondary earner husbands worked part time by choice. By 1990's, 86% of parents with children of any age will both be in the work force.

Perhaps one of the most startling projections is this: a married woman can expect to spend 34 years in the labor force; if not married, she can expect to spend 41 years. She can expect to spend 2/3 of her adult life without children in the home and 1/4 to 2/3 of her adult life without a husband.

The only tradition which seems to persist is the discrepancy in pay between males and females in nearly every occupational area, even when experience and educational preparation are held constant. This tradition contributes to the growing significance of the problem of poor women, i.e., the "feminization of poverty." Women who are single heads of households are more likely to be poor. They headed approximately 50% of all families below the poverty threshold. Approximately 75% of all families headed by women of color are living in poverty.

In summary, sex role stereotyping and gender bias lead to gross underutilization of talented men and women in occupational training programs, in the paid labor force and in the family. Gender equity, on the other hand supports growth and opportunity for all people.

Our greatest challenge as vocational educators is to tap and develop the talents and skills of *all* students to meet future individual, business and societal needs. We need to attract and keep good students of both sexes. What better way to meet this challenge than to create an institutional environment which helps students to free themselves of sex role expectations and then to provide students with effective support for the choices they make. What better way to meet this challenge than to develop individual and institutional practices which promote equal opportunities, build partnership skills and enhance people's ability to work together productively. What better way to meet this challenge than by building into course content the resource material and experiences which prepare students for the technological, cultural and social changes in the work place.

sex-role expectations

personal goal — To further understand your own sex-role expectations and limitations.

directions — List as many items as you can for each category:

	I am required to	*I am allowed to*	*I am forbidden to*
1. Since I am a ~~woman~~ (man).			

	I could	*I would*	*I would not*
2. If I were a woman (man)			

3. The "human" in me wants to _____

4. The most important thing in life for a man is _____

5. The most important thing in life for a woman is _____

explanation — This exercise is a further attempt to help you explore some of the dimensions of your own sex role and to understand what other options might be available.

Source: Beyond Sex Roles, Second Edition - Alice G. Sargent

Activity/
Handout

Gender Communications Quiz

How much do you know about how men and women communicate with one another? The 20 items in this questionnaire are based on research conducted in classrooms, private homes, businesses, offices, hospitals—the places where people commonly work and socialize. If you think a statement is generally an accurate description of female and male communication patterns, mark it true. If you think it's not an accurate description, mark it false.

		True	False
1.	Men talk more than women.	☐	☐
2.	Men are more likely to interrupt women than they are to interrupt other men.	☐	☐
3.	There are approximately ten times as many sexual terms for males as for females in the English language.	☐	☐
4.	During conversations, women spend more time gazing at their partner than men do.	☐	☐
5.	Nonverbal messages carry more weight than verbal messages.	☐	☐
6.	Female managers communicate with more emotional openness and drama than male managers.	☐	☐
7.	Men not only control the content of conversations, they also work harder in keeping conversations going.	☐	☐
8.	When people hear generic words such as "mankind" and "he," they respond inclusively, indicating that the terms apply to both sexes.	☐	☐
9.	Women are more likely to touch others than men are.	☐	☐
10.	In classroom communications, male students receive more reprimands and criticism than female students.	☐	☐
11.	Women are more likely than men to disclose information on intimate personal concerns.	☐	☐
12.	Female speakers are more animated in their conversational style than are male speakers.	☐	☐
13.	Women use less personal space than men.	☐	☐
14.	When a male speaks, he is listened to more carefully than a female speaker, even when she makes the identical presentation.	☐	☐
15.	In general, women speak in a more tentative style than do men.	☐	☐
16.	Women are more likely to answer questions that are not addressed to them.	☐	☐
17.	There is widespread sex segregation in schools, and it hinders effective classroom communication.	☐	☐
18.	Female managers are seen by both male and female subordinates as better communicators than male managers.	☐	☐
19.	In classroom communications, teachers are more likely to give verbal praise to females than to male students.	☐	☐
20.	In general, men smile more often than women.	☐	☐

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Source: *Classroom Activities in Sex Equity for Developmental Guidance. Wisconsin Department of Public Instruction*

Handout

EQUITY TERMS

"Gender Equity" is the term that describes an educational environment where individuals would consider options and make choices based on their abilities and talents and not on gender role stereotypes and expectations. In addition, there are many other terms about gender equity that are new and sometimes confusing.

1. *Sex/Gender Discrimination*--Any action which limits or denies a person or group of persons opportunities, privileges, roles or rewards on the basis of their sex.

2. *Sex/Gender Bias*--Behaviors resulting from the assumption, that one sex is superior to the other.

3. *Sex/Gender Role Stereotyping*--Attributing behaviors, abilities, interests, values and roles to a person or group of persons on the basis of their sex.

4. *Occupational Gender/Sex Role Stereotypes*--Those in which specific occupations are linked, and believed to be appropriate, to members of one or the other gender.

5. *Equity*--Moving beyond discrimination; equalizing, reforming and improving; based on concepts of fairness, justice, and freedom from favoritism.

6. *Equality*--The quality or state of being equal.

7. *Gender Fairness*--Treating both sexes in the same manner.

8. *Gender Affirmative*--Providing special assistance to one sex so she or he may benefit from the same opportunities as the other sex.

9. *Androgyny*--Refers to one's characteristics that are free from rigid sex-role stereotypes. The androgynous person is viewed as able to exhibit behaviors that are both traditionally feminine and traditionally masculine.

10. *Feminine*--Having characteristics or behaviors considered unique to women.

11. *Masculine*--Having characteristics or behaviors considered unique to men.

12. *Nontraditional Worker*--A person employed in an occupational area once considered appropriate for the opposite sex.

13. *Nontraditional Occupations*--Those not traditionally held by members of one sex. For example, carpentry is a nontraditional occupation for women; nursing, for men.

DIFFERENTIATE BETWEEN BIAS AND DISCRIMINATION

We must distinguish between sex discrimination and sex bias. Sex discrimination can be defined roughly as illegal behavior that denies someone's rights or limits his or her opportunities.

Bias is the underlying network of assumptions we all grew up with. It's the belief that women and men are and should be different, not only physically, but in personalities, abilities, and occupations. Most biased behavior is not damaging if it happens only once. It matters when it forms a pattern that carries a message that shapes an individual. All of us are biased because we all grew up in the same system. Even professionals in the field of sex equity catch themselves with biased attitudes frequently.

Source: Pioneering Programs in Sex Equity: A Teachers Guide, by Amanda Smith and Charlotte Farris

WOMEN GET A RAISE - FROM 59 CENTS TO 64 CENTS

Women still earn far less than men but a new Census Bureau report indicates many will see their economic situations brighten in coming years.

"The report has good news and bad news," co-author Cynthia Taeuber, a Census Bureau demographic specialist, said Tuesday. "For older women and teen-age mothers it shows they're in for rough times."

But for women between the ages of 25 and 44--the "baby boomers"--Taeuber said the data indicates "the more they move into professions that aren't traditionally 'female' the better off they're going to be."

Women in the American Economy - A compilation of data from the 1980 census, the 1985 current population survey and other reports--shows:

> The "pay gap" between men and women is shrinking slowly. In 1970, the median income of a woman who worked full-time was 59% of a man's. By 1984, the median for women was $15,422--64% of the $24,004 median for men.
>
> Many jobs are still largely segregated by sex. There were three times as many male managers in 1980 as there were female. But women are making inroads: In 1970, they accounted for 33.9% of all managers and professionals. By 1980 their share was 40.6%.
>
> Most entry-level female professionals can expect salaries equal to those of new male employees. Example: 1981 data indicated that 86% of female accountants received entry-level salaries that matched their male peers.
>
> However, poverty rates for female-headed households are rising: 60.9% of households headed by single women with young children were classified poor in 1984, up from 57.5% in 1978.
>
> Many black women should be better off in years to come than their mothers and grandmothers. In 1980, two out of three elderly black women were employed as service workers. Most weren't going to be eligible for Social Security payments--one reason 35.6% of elderly black women were classified as poor in 1984.
>
> But in 1980 almost two-thirds of young black women were professionals, secretaries, laborers or machine operators.

Source: USA Today, 3/4/87. Author: Mark Memmott

WHY SEX EQUITY?
WHY PROMOTE NONTRADITIONAL OPTIONS?

Strengthen Families by minimizing economic strain, training people for flexibility, increasing father's interaction with children, and increasing the value, respect, and dignity in the work of the family.

Reduce Poverty and Increase Tax Revenues as people obtain higher paying jobs and the cycles of unemployment, underemployment, and welfare dependency are broken.

Increase Worker Productivity by a better matching of individuals with jobs, by minimizing tense work environments, by increasing new and innovative solutions to work related problems, and increasing job satisfaction.

Meet the Needs of Employers for skilled workers in certain industry and certain job categories where shortages are expected.

Help Employers fill affirmative action requirements.

Reduce the Effects of Declining Enrollments by recruiting new women students and by increasing dual enrollments.

Improve Vocational Education's Curriculum for all students by questioning assumptions and traditional teaching methods and by updating those where necessary.

Improve Vocational Education's Ability to meet new and emerging occupational training demands and to assist displaced workers.

Improve Vocational Education's Image through new and increased publicity and by actualizing a commitment to serve all students.

Attract New Industry by ensuring a skilled and diverse workforce.

ADVANTAGES OF NONTRADITIONAL JOBS

Nontraditional jobs offer a variety of advantages. Some of the major rewards include the following:

Salary: Nontraditional jobs often afford the opportunity for better pay for women. With more jobs to choose from there is a better chance of getting a better-paying job. Jobs traditionally held by men do pay better wages. Furthermore, men working in jobs which are nontraditional for them (the female-dominated jobs) often earn more than women who work in those fields.

Advancement Opportunities: Nontraditional jobs, especially those in the apprenticeable trades, usually have established steps for advancement. For example, in construction work, a worker can move from apprentice to journeyworker, to supervisor, to superintendent, and so on. Workers in some trades start their own contracting businesses.

Benefits: In nontraditional jobs which are unionized, the wages are usually higher; various fringe benefits and job protections may be negotiations.

The Work Itself, Satisfaction: The greater the range of experience a job offers and the more options it makes available, the greater the chances for self-satisfaction.

Education/ Training: Most nontraditional jobs require specialized skills, which are usually compensated according to the amount of training or education. Apprenticeship training, for example, usually provides beginning wages equal to half of what the trained journeyworker earns. As the apprentice learns and performs better, she or he generally receives periodic increases in wages. When training is completed, the apprentice is usually earning 90 percent of journeyworker wages. This process enables trainees to earn while they learn.

Work hours: Many nontraditional jobs in the skilled trades have potential overtime pay. Also, these jobs often provide a greater variety of schedules or shifts to choose from, and pay for evening and night shifts is often higher.

Source: Women and Work--Today and Tomorrow

FACTORS DETERRING WOMEN FROM ENTERING NON-TRADITIONAL CAREERS

1. Conceptions of male-dominated work environments.

   Such as "An employed woman may not be willing to risk seeking a job usually held by men because she feels she wouldn't be paid as much as a man."

2. Self-concept and perceptions of abilities.

   Such as "Women do not seek the same careers as men because they lack self-confidence.

3. Reinforcement of stereotyped role by family.

   Such as "A woman is likely to choose to enter a "female" career (those usually dominated by women) because she has not been told to pursue other alternatives."

4. Establishing priorities with regard to family responsibilities and career needs.

   Such as "Women have traditionally remained in certain jobs and professions because they believe that a woman should be supportive of her husband's career."

5. Attitude of others at the entry and training levels.

   Such as "If a woman seeks information about non-traditional occupations (those usually held by men) she may find that she has difficulty getting information about the openings in these occupations."

6. Attitudes of friends.

   Such as "A woman who makes plans to enter a career usually sought only by men is likely to feel that her friends think that she should seek a job in an area where more women are employed."

7. Security in traditional jobs.

   Women who hold jobs in traditional female fields find it difficult to leave their jobs to acquire jobs traditionally held by men because they know they can be successful in the job they hold.

8. Self-concept as a working professional.

   A woman may decide not to enter careers that are usually held by men because she doesn't feel that she is as competent as the man in the field.

9. Myth . . ."A woman's place is in the home."

   A woman may be reluctant to pursue a career in a field dominated by men because those careers wouldn't give her time to be a mother.

FACTORS DETERRING WOMEN (continued)

10. Choosing to follow traditional job pattern.

    A woman is likely to choose to enter a "female" career because her friends chose it too.

11. Obtaining information about non-traditional jobs and training.

    If a woman seeks information about non-traditional occupations she may have difficulty knowing where to start looking for information needed.

12. College education for women.

    College education for a woman reduces her options for employment.

13. Fear of the non-traditional job setting.

    A woman who obtains a job in an area dominated by men may find it difficult to cope with because of the dangers that exist in some jobs.

14. Superiority of men in non-traditional jobs.

    A woman may be reluctant to seek training for a career usually held by a man because she feels that men are more competent than women in some areas such as math and science.

15. Fear of failure or dissatisfaction in non-traditional job or training program.

    Women may decide not to enter careers that are usually held by men because she doesn't want any hassle on the job.

16. Myth . . ."The successful woman in a non-traditional job."

    A woman may feel that if she is successful in an occupation typically held only by men that men would not have anything to do with her socially.

17. Money for training.

    A woman may be reluctant to seek training for a career usually held by men because she has a low paying job which doesn't allow her to save enough to pay for additional training.

Developed by Hollie Thomas. University of Florida

SOME NONTRADITIONAL JOB OPPORTUNITIES FOR WOMEN

PROFESSIONAL

Engineering
Law
Medicine
Science
Mathematics
Geology
Environmental Science
Architecture
Landscape Design
Forestry
Geography
Anthropology
Foreign Service
Journalism
Psychology
Educational Research/Administration
Accounting
Protective Services (Fire/Police)

MARKETING

Commission Sales
Graphics
Advertising
Freight Forwarding
Shipping (Domestic/International)
Transportation (Airlines/Trucking)

TECHNICAL

Airplane Pilot
Air Traffic Controller
Computer Technician
Computer Programmer
Electronics
Radio/T.V.
Drafting
Chemical Technician
Medical Technician
Surveyor
Photographer
Engineering Technician
Mathematical

SKILLED CRAFTS/TRADES

Telephone Repairer
Office Equipment Repairer
Small Appliance Repairer
Tool & Die Maker
Computer Repairer
Shipfitting
Construction
Plumbing
Electrical
Auto Mechanics
Diesel Machines
Masonry
Carpet Layer

APPRENTICESHIPS

Drywall Finisher
Lather
Carpenter
Electrician
Metal Fabricator
Millwright
Plumber/Pipefitter
Bricklayer
Cement Mason
Glazier
Plasterer
Iron Worker
Painter
Heavy Equipment Operator
Tilesetter
Air-Conditioning Mechanic
Meatcutter
Printer
Boiler Maker
Carpet Layer
Welder

TRAINING PROGRAMS

Auto Mechanic
Diesel Mechanic
T.V. and Radio Repairer
Auto Body Repairer
Electronics
Machinist
Replacement Parts Management
Welding
Drafting Technician
Surveying
Mechanical Engineering Technician
Forestry Technician
Chemical Technician

OTHER JOBS

Sales: Commission
  Auto
  Insurance
  Furniture
  Appliance
Laboratory Technician
Dental Lab Technician
Driving
  Local
  Long-Haul
  City Bus
  Taxi
  Ambulance
  Commercial Driver
  Furniture Mover
  Heavy Equipment
Greenskeeper
Fire Fighter
Fire Watcher
Tree Planter
Park Aide
Meter Reader
Utility/Telephone Installer
Sewage Treatment Operator
Water Treatment Operator
Chemical Plant Operator
Gas Station Attendant
Tire Changer
Parts Runner
Shipping and Receiving Clerk
Mail Deliverer
Office Equipment Repairer
Appliance Repairer
Laborer, Road
Laborer, Construction
Production/Mill Worker
Flag Person
Security Guard
Warehouse Worker
Lumber Yard Attendant
Roofer
Cabinet Maker
Upholsterer
Store Detective
Custodian

Source: Women and Work--Today and Tomorrow

THE BOTTOM LINE: NONTRADITIONAL JOBS

An important underlying cause of the earnings gap between men and women is the kind of work that women do, particularly blue-collar women. Simply put, what we must do to improve the economic position of women is to get them into the jobs that pay more--those usually referred to as "nontraditional."

Despite the many efforts to achieve sex equity in the workforce, progress has been slow and change has not come easily. Moving more women into nontraditional occupations in the future will depend on the willingness of employers and educators alike to continue to accept the challenge to do so--to be innovative in our approaches, and to persevere despite tenacious beliefs about stereotypical women's roles.

The Women's Bureau of the U.S. Department of Labor defines nontraditional jobs as those in which women make up 25 percent or less of the total number of workers. The jobs range from blue-collar jobs to professional and management positions, but the hard-core end of the spectrum is the blue collar. If we can make progress in this area, other changes will seem easy.

Between 1972 and 1981, the number of women in craft jobs in the United States increased by more than 100 percent, but much of this growth was in more traditional jobs such as printing, decorating and window dressing--not in carpentry, electrical or mechanical work. The number of women operatives increased only marginally; the jobs were concentrated in factories, laundries and dry cleaning plants. Few women held more skilled jobs such as lathe and drilling machine workers or mine operatives. In fact, the largest blue-collar employment gain for women was bus drivers--jobs which are often part-time, part-year, and low-paid.

The catalyst that brings women into nontraditional occupations is often dire economic need. Nearly two-thirds of all women workers are either unmarried or have husbands earning less than $15,000 a year. Forty-seven percent of all families maintained by women are below the poverty level. Ninety percent of one-parent families are solely dependent on a female head for support.

It is largely this unfortunate reality that helps to attract women to nontraditional jobs today. But it is very important that we look to the future. We must assist in the long-term effort of changing the perceptions of young women who are still in school about what roles are appropriate for women and for men.

At my company, Sears, we've been hammering away at the problem for over a decade. Our nontraditional jobs are primarily in automotive and merchandise repair. We now employ over 3,000 women in these jobs and they represent 7.2 percent of all such Sears employees--over twice the national rate. Sears employs over 5 percent of all women who are service technicians.

We have found that there are many barriers that inhibit women from seeking nontraditional employment. Among the most critical are those that flow from peer and parental pressure coupled with school counseling, which continues to steer young women into traditional

curricula. The lack of sufficient role models in media and advertising serves to further deter women from considering nontraditional work as a positive career option. Even if a woman gets as far as looking for such a job, she may encounter discouragement from those who should be encouraging her.

The National Commission on Secondary Vocational Education reported in *The Unfinished Agenda* that "vocational programs and guidance services need to place more emphasis on redressing issues of sex bias and equity." For too long, a vicious cycle has existed in which employers have claimed they can't hire the women they need because the vocational education system isn't producing them, and the schools have been saying, "Why should we train them when business isn't hiring them?"

Now there is a new factor, a growing movement in some states to neuter the option of vocational education at the high school level. This movement ignores the needs of high school students who do not plan to go to college, and it also ignores the needs of employers.

We need employees who can manage our business, but we also need people who can install and service the merchandise we sell, and we need women among them. Without vocational education, we're not going to be able to find those people. For it is hard to find them. At Sears, we use every possible resource to recruit women for nontraditional jobs. We go to the trade and technical schools, to vocational programs in comprehensive high schools, to organizations which serve women, like the YWCA. But to locate women for our blue-collar jobs, we have to dig deeper to find groups for whom this is a specific focus, and we've formed partnerships and coalitions with many of them.

Up until the 1970s, we put our women service technicians through the same training courses we'd always used when technicians were primarily men. And we experienced very high turnover because the women had not had the basic course work in school or the prior work experience of the men. So we developed additional courses such as tools of the trade, basic electronics and basic electricity, which served to bridge that knowledge gap.

We've done a useful follow-up study of women performing nontraditional work at Sears. Their likes and dislikes about the work surfaced, and they provided suggestions for improving work conditions and training methods. One of the most significant findings was the high level of job satisfaction among the women. They expressed their pleasure in being able to handle challenging, difficult tasks and to see proof of their achievements.

"It's instant reward," said one. "You start and complete a task, make people happy." Another declared, "When you fix something, it works right there in front of you. You and you alone do the work. You are not a cog in a long line of machinery. You're the whole thing, right there. You don't have to depend on anyone else."

Over the past decade and a half, whatever improvements Sears has made in women's nontraditional employment have come more slowly and with greater difficulty than we would have liked. And we've come to realize that we can't change things alone. We must work with others who share our goals in order to create a louder and more effective voice for change.

THE BOTTOM LINE: NONTRADITIONAL JOBS (continued)

Whether we're talking about using vehicles such as education, coalitions or affirmative action programs, we're talking about shared efforts that will enable this country to make better use of the talents of all its people. But regardless of the vehicles, we must be certain that we travel the right path. That path must be cleared to ensure that the adult work reality of today's women is presented to youth in time and in ways that will prepare them for making good career decisions. Effective networks must continue to be built to bridge the gaps between the world of work as it once was and the one it must become to enable this country to continue to be competitive in the future.

All of this means change, in one way or another. And we have but one choice: to allow that inevitable change to manage us, or to manage it to our benefit. By working together, we can influence the course of the next decade so that, in time, there will be no occupations which are nontraditional for women.

Some people, regardless of their sex, think women aren't going to really dig in and get their hands greasy at the high-paying craft jobs in the American workplace. But as one young women automotive technician told me, "I can afford to buy the best soap there is--on my way to the bank!"

Author: Sandra Crawford Hagerty

Source: Vocational Education Journal, October 1985.

SURVEY COMPONENT

SURVEY COMPONENT
NONTRADITIONAL OPTIONS
BLACKHAWK TECHNICAL COLLEGE

6 SESSIONS 9 HOURS

OVERVIEW

The survey component of the Nontraditional Options Workshop is designed to introduce women to technical skills development which will be useful for many nontraditional programs. This portion of the workshop will introduce you to basic electricity, print reading, safety, tool usage, and measurement. These are basic concepts which are central to many Nontraditional Vocational Programs (e.g., printreading is necessary for welding, machine tool, machine maintenance, airframe & powerplant, mechanical design, etc.)

OBJECTIVES:

Participants will: increase their knowledge of safety issues vis-a-vis work, home, school; become familiar with basic tool usage through lecture, discussion, and hands-on experience; learn about basic electricity and its role in our work and home environment; be introduced to print reading and its application in the world of work.

GOALS OF SURVEY

To increase knowledge and understanding of technical concepts.

To improve basic skills in measurement and tool usage.

To create awareness of General Safety Issues.

To introduce students to career opportunities which utilize these technical skills.

To help students become familiar with technical vocabulary, ideas, concepts, tools which will be used in Nontraditional Vocational Programs

To increase participant self-confidence.

SURVEY-COURSE OUTLINE

Session I

Introduction
Topic: Safety Issues
(general, home, workplace)

Format: Lecture, discussion, videotape

Session II

Topic: Measurements: concepts, instruments, practical uses, conversions, occupations involving measurements.

Format: Instructor demonstration of measuring instruments.
Students hands-on exploration.
Hand-out and Film.

Session III

Topic: Hand Tools (industrial, commercial and home)

Format: Instructor demonstration
Students hands-on exploration.
Film.

Session IV

Topic: Basic Electricity (electrical path; sources; uses in industry, home, recreation, occupations involving knowledge of electricity)

Format: Discussion
Hands-on exploration

Session V

Topic: Print Reading (uses; occupations involving printreading; understanding lines, views, dimensions)

Format: Discussion
Hands-on exploration

A description of each session can be found on the following pages.

Session Descriptions

Session 1

1.) Introduction

Students will complete a brief interest inventory which will assist the instructor in determining participant interests and class expectations. Discussion will focus on individual reasons for enrolling in the Nontraditional workshop and a description of the survey portion of it. (Appendix)

2.) Safety Issues

a.) Accidents
b.) Safety in the home
c.) Transportation safety
d.) Work/School: physical and mental safety requirements
e.) Protective clothing
f.) Fire safety

3.) Questions and Concerns about:

a.) Safety Issues

b.) Today's scheduled nontraditional program

Films: "Types of Fires"

"Types of Firefighting"

Session 2

1.) Measurements

a.) Introduction to Measurement
b.) Decimals; fractions; problem solving
c.) Demonstration of measuring instruments: rules, calipers, tapes, micrometers
d.) Measurement use in home, school, industry
e.) Occupations requiring skill in measurement
f.) Hands-on skill building

2.) Questions and Concerns about:

a.) Measurement
b.) Today's scheduled nontraditional program

Film: "Measurement:High Tech"
Hand-out: Mill Shapes (Appendix)

Session 3

1.) Hand Tools

a.) Demonstration of commonly used tools:
hammer, saw, file, tap, drill, screwdriver
b.) Demonstration of fasteners:
bolts, screws, rivets, metal screws, etc.
c.) Hands-on practice with tools and fasteners

2.) Questions and Concerns about:

a.) Hand Tools
b.) Today's scheduled nontraditional program

Film: "Don't Push Your Luck"

Session 4

1.) Basic Electricity

a.) Permanent sources of electricity
b.) Temporary power sources
c.) Portable generators

2.) Standards and Practices

a.) Public Service Commission
b.) Citizen's Utility Board
c.) Environmental Commissions
d.) Safety Boards
e.) Underwriter's Laboratory

3.) Home/Industrial Electrical Systems

a.) Fuses
b.) Center of control
c.) Overloads

4.) Occupations Requiring Knowledge of Electricity

5.) Questions and Concerns about:

a.) Electricity
b.) Today's scheduled nontraditional program

Session 5

1.) Print Reading

a.) Transition from Blue Prints
b.) Anatomy of a print:
lines, views, features, dimensions
c.) Developing the print:
the process

2.) Occupations Requiring Knowledge of Print Reading

3.) Questions and Concerns about:

a.) Print Reading
b.) Today's Scheduled Nontraditional Program

SESSION # 1 **GROUP 5**

HAND OUTS

Please list any "Special" interests/or additional information you would need.

SIGNED _____

PLEASE RETURN TO INSTRUCTOR AT THE END OF THE CLASS.

Form 1-A
Noah Shaw

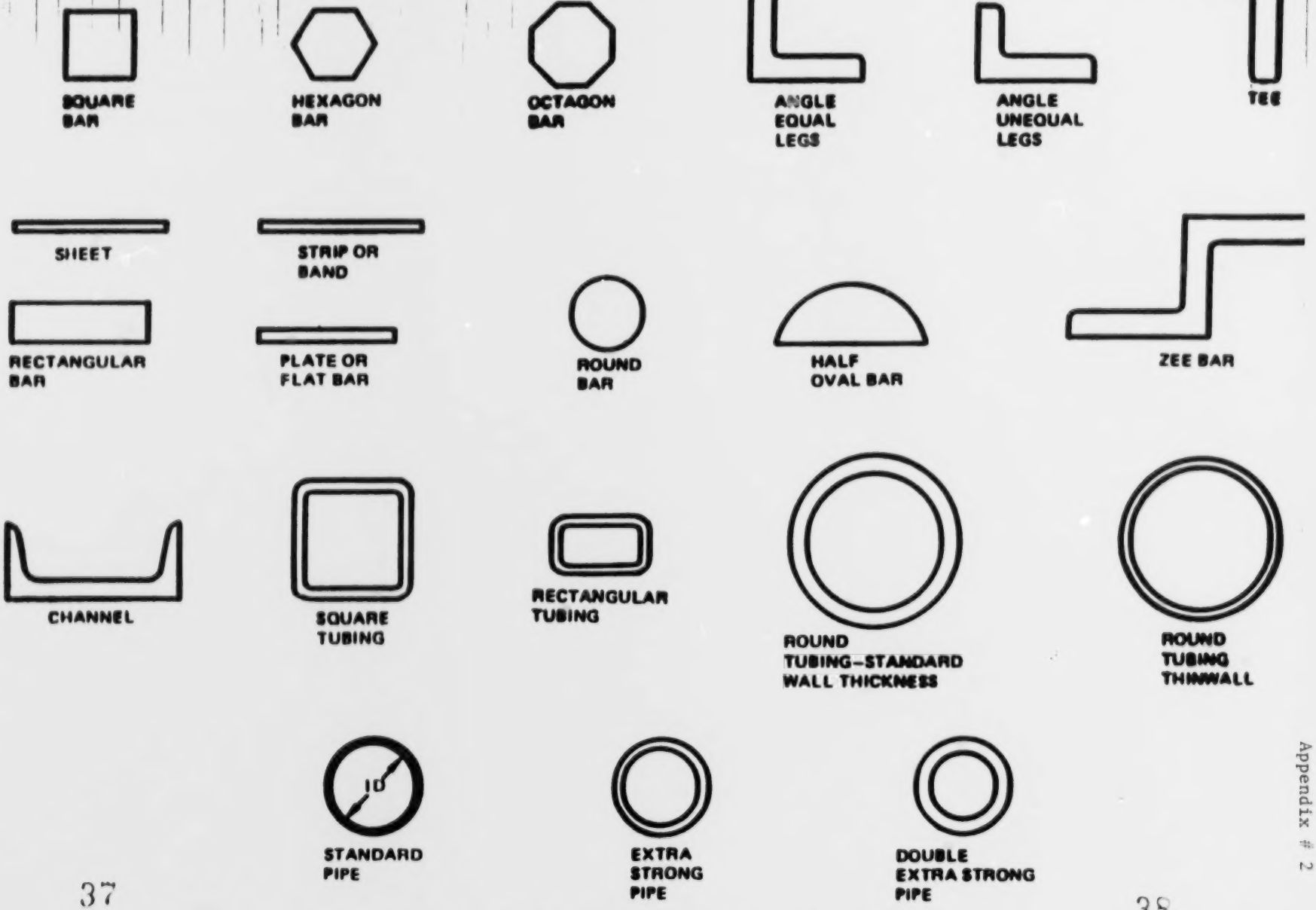

Fig. 5-2 Common structural metal shapes

MATH COMPONENT

Instructor's Guide

The material in this booklet has been prepared for a six-session Non-Traditional Options workshop, each session being 1 1/2 to 2 hours long. The workshop is meant to give a brief overview of basic math operations. For participants who have had little math exposure in the past several years, it is highly recommended that the participant also be enrolled in GOAL math courses to get an in-depth review of basic math operations.

However, basic math review should not be the primary emphasis of the workshop. Instead, the intent of this workshop is developing a positive attitude toward the study of math, reducing math anxiety, and developing math study skills. Materials have been designed to help the participant understand her own math attitudes and biases, debunk the myths surrounding math, and suggest ways to overcome self-defeating behaviors.

The atmosphere in the classroom would ideally be one that let the participants express fears and dislikes of math openly. Participants should be encouraged to ask questions freely thus building their confidence in asserting themselves. Arriving at answers by intuition instead of knowing exact formulas should be encouraged. Estimating answers before doing mechanical procedures develops this use of intuition. Real-life math applications should be assigned as homework each session to emphasize the relevance of math to every-day life.

Much of the material in this booklet was adapted from three references books that provide excellent insight into learning mathematics and attitudinal barriers that surround that learning. They are:

1) Mind Over Math, by Stanley Kogelman and Dr. Joseph Warren

2) Your Number's Up: A Calculated Approach to Successful Math Study, by C. Ann Oxreider

3) Overcoming Math Anxiety, by Sheila Tobias

Suggested Daily Session Format:

1) Questions and review of previous session

2) Discussion of myths, attitudes, behaviors, and study skills

3) Basic math review

4) Assignment of real-life math homework

Math: The Key, or Locked Door to New Career Opportunities

If you are considering a technical or scientific career, a working knowledge of math will be necessary to achieve your career goal. Why is math so necessary? Because math is the language of science and technology. If you are planning to work in France, you need to learn French. If you are planning to work in science, you need to know the language science uses.: the language of math. Like any other language, math uses symbols and formulas that are unfamiliar to us at first, but we learn the meaning of these symbols and formulas through practice. Languages have grammar rules to be memorized and followed so we can use the language to communicate with others. Math also has rules to memorize and follow so we can communicate our work clearly to others. Languages are cumulative: one topic builds on another. You can't make sense of second-year French without having the building blocks of first-year French mastered. You can't make sense of algebra before you have mastered the building blocks presented in a basic math course. As you learn to view math as a language and study it as you would a language, you will see the necessity of learning math to communicate scientific and technical information.

Many people have emotional barriers that prevent them from pursing the study of math. Negative experiences in grade school or high school math have left a sour taste that discourages further math encounters. Many otherwise confident and capable people feel they just don't have a "math mind" and will never be able to understand math. Yet study after study shows that there is no such thing as a "math mind", and that almost everyone is capable of doing math once his or her attitudes about math have been changed. Failure to do well in math has much more to do with attitude and lack of study skills than it does with a lack of ability. This workshop will emphasize and provide guidelines for the study of math that will improve your chances of math success. Hopefully, you will see your career options widen as you learn to appreciate the value of mathematics.

Finish the following sentences in a few words or paragraphs, then look over the picture you have drawn of your attitudes toward yourself and toward mathematics:

ATTITUDES TOWARD MATHEMATICS

1. Math is _____

_____

2. My background in math is _____

_____

3. My ability to do math is _____

_____

4. Doing math makes me feel _____

_____

5. My most positive experience with math was when _____

_____

6. My most negative experience with math was when _____

_____

7. When it was time for math in grade school I _____

_____

8. When it was time for math in high school I _____

_____

9. My high school math teachers _____

_____

10. My father felt that math was _____

_____

11. My mother felt math was _____

_____

12. When it comes to math boys are _____

_____

13. When it comes to math girls are _____

_____

14. People who are good at math _____

_____

15. I want to become better at math so that I _____

_____

16. When it comes to math, I find it difficult to _____

_____

17. I am nervous about math because _____

_____

Modified from Overcoming Math Anxiety by Sheila Tobias

WHAT IS MATH ANXIETY???

The dictionary defines anxiety as a "state of being uneasy or worried about what may happen." People who avoid math will say "uneasy or worried" is too mild to describe their feelings. When faced with mathematical tasks many people experience extreme discomfort.

MATH ANXIETY can be an intense emotional reaction to math based on past experiences.

Many men and women, from students to corporation presidents, suffer from math anxiety. Sixty to eighty percent of the adult population suffer to some degree.

COMMON REACTIONS OF MATH ANXIETY INCLUDE:

1. BLOCKING OUT - Suddenly everything goes blank. You forget the math skills you know, even the simplest addition.

2. TENSION - You may begin working the problem, but feel your body tighten up or your neck or back get stiff.

3. PANIC - There is a feeling of coming disaster. Your pulse races and you perspire heavily. You're sure the problem cannot be done. You feel defeated.

4. PARANOIA - You suspect that everyone knows how stupid you're feeling. You think "Probably everyone can do the problem but me."

5. TUNE OUT - When numbers come up or when math is mentioned, the rest of the conversation is lost on you. You fail to hear what the person is saying. If you're reading a book with numbers, you have no idea what you've read at the end of the page.

6. GUILT - You may feel that even your ability in the little bit of math you do is a fraud. You've been faking what you can do and sooner or later you will be discovered. Maybe you suspect it's your fault that you have the problem.

7. PHYSICAL REACTION - When you deal with math you may get a headache, become nauseous, have stomach cramps, experience blurred vision, lose your ability to concentrate, or get very sleepy.

8. AVOIDANCE - Sometimes the most comfortable way to deal with a problem is to avoid it. You may try hard to stay out of situations where you encounter math.

Dealing With Math Anxiety

If you are anxious about math, you may want to look back on your math history and pinpoint specific classes or teachers that made you lose confidence in your math ability. Talking about past experiences with others often helps you realize you are not alone in your math anxiety.

But placing blame on specific people or situations doesn't change your current state of affairs. To break down your math barriers, try a few of the following suggestions:

1. Accept your negative feelings about math . . . you have the right to dislike math. But don't let these feelings stop you from meeting the challenge of learning the math you need to obtain your career goals.

2. Realize that you are a much different person now than you were when you first experienced math negatively. You are a competent adult with much real-life experience behind you , and you will now be better able to see the places in real-life where a knowledge of math is necessary.

3. Identify your self-defeating behaviors and thoughts. Replace negative thoughts with positive ones.
   Example: "I see math as a challenge,not a problem."

   "I can do anything I want to, so I can do math."

   Write some of your own positive math statements.

4. Be assertive in asking for help. Go to see your math teacher during her office hours. Make use of the tutors in the Learning Lab.

5. End math avoidance. Seek opportunities to use math: Carry a calculator with you so you can figure your own grocery bill, calculate the amount of tip to leave at a restaurant, or figure the discount on a sale item. The more you use math in everyday life, the more confident you will become in math.

6. Before you do homework, take a few minutes to relax, slow your breathing, and think positive thoughts.

7. Start reviewing math at an appropriate level. Starting at a level too advanced is like taking second year Spanish when you haven't yet had first year Spanish . . you will only get more frustrated.

8. Keep a basic math textbook handy to use as a reference book. You can't possibly memorize everything in math, so be able to look information up when you need it. A basic math textbook is as essential to studying math as a dictionary is to studying a language.

9. Expect your attitudes to change slowly -- there is no magic "fix" to take away anxiety immediately. Take pride in the small steps you make in reducing your discomfort with math. In time, you will appreciate the challenge math offers you, and you will see the importance of math as a tool in understanding scientific and technical fields.

MATH ANXIETY BILL OF RIGHTS

By Sandra L. Davis*

I have the right to learn at my own pace and not feel put down or stupid if I'm slower than someone else.

I have the right to ask whatever questions I have.

I have the right to need extra help.

I have the right to ask a teacher for help.

I have the right to say I don't understand.

I have the right to feel good about myself regardless of my abilities in math.

I have the right not to base my self-worth on my math skills.

I have the right to view myself as capable of learning math.

I have the right to evaluate my math instructors and how they teach.

I have the right to relax.

I have the right to be treated as a competent adult.

I have the right to dislike math.

I have the right to define success in my own terms.

*From Overcoming Math Anxiety, by Sheila Tobias

Math Quiz: True or False

1. Men are better in math than women.
2. Math requires logic, not intuition.
3. You must always know how you got the answer.
4. Math is not creative.
5. There is a best way to do a math problem.
6. It's always important to get the answer exactly right.
7. It's bad to count on your fingers.
8. Mathematicians do problems quickly, in their heads.
9. Math requires a good memory.
10. Math is done by working intensely until the problem is solved.
11. Some people have a "math mind" and some don't.
12. There is a magic key to doing math.
13. It is cheating to use a calculator.
14. I will never need to use math.

MATH GAMES WE PLAY ON OURSELVES

Most of the time we have little conversations going on in our heads. Internal voices tell us how to feel (don't be nervous, stop worrying), and how to behave (be serious, stop being silly, control yourself). They compliment us (that was great, you did a good job, you deserve to celebrate) and criticize (don't be so clumsy, that was dumb, that was stupid). When faced with math, these little conversations become very critical and can cause you to give up. They are self-defeating games -- games you play on yourself. If you know what these games are, you will be able to catch yourself playing them. This will help you to stop.

Each statement below represents a self-defeating behavior or thought we all have practiced at some time. After each statement write a positive statement that counter-acts the self-defeating behavior or thought.

1. I don't have time to study math every day but I try to catch up on weekends. _____

   _____

2. I am embarrassed to ask my teacher or a tutor for help . . . they will think I am dumb. _____

   _____

3. I never ask a question during math class when I'm confused because everyone else knows what's going on except me. _____

   _____

4. I don't take notes in class when I understand what the teacher is explaining. _____

   _____

5. I don't take notes in class when I get lost and can't follow the teacher's explanations. _____

   _____

6. I don't bother to get notes from someone else in the class if I have missed class. _____

   _____

7. I never read my math textbook. _____

   _____

8. I don't do math fast enough. _____

_____

9. I just don't have a math mind. _____

_____

10. Math is unrelated to my life, so I'll never need to know it. _____

_____

_____

STUDYING MATHEMATICS

IN CLASS

1) Sit in the front of the classroom. You will see better, hear better, and will be less likely to "tune out".

2) Each day, write down the date and the section in the text you will be discussing so you can later refer to your textbook.

3) Always take thorough notes in class. Write down all examples. Keep taking notes even if you get lost. Take notes even if you understand what the teacher is saying at the time . . . . you may not remember later. Taking notes reinforces learning . . . . you remember more when you write it down.

4) Ask questions in class.

5) Review previous day's notes before class so you will remember what was talked about, and will be ready to go on to new material.

6) Attend each class. Understanding tomorrow's new material depends on understanding today's assigned material. Know the phone number of your teacher or a classmate, and call them to get the assignment if you ever have to miss a class. Then try to do the assignment before the next class. Get the notes you missed from a classmate who takes good notes.

7) Know your learning style. If you are an auditory learner, tape record the lecture. If you are a visual learner, draw diagrams and pictures and take detailed notes. If you are a social learner, find someone to study with. If you learn best by reading, emphasize reading your textbook.

STUDYING MATHEMATICS

HOMEWORK

1) Organize your notes and homework. A loose-leaf binder containing loose-leaf paper works well for organizing math materials. Inexpensive tab dividers can be inserted to separate class notes, homework problems, completed tests, and handouts. Keeping materials organized and easy to find is essential to the study of any subject.

2) Keep all work . . . . tests, notes handouts . . . to review when necessary.

3) Do homework as soon after class as possible so you remember what was discussed in class.

4) Review your class notes and rework classroom examples before starting your homework.

5) Read the assigned section in your textbook before starting your homework. Read slowly and carefully. Read with pencil and paper in hand, and work through the examples given. Take notes from your textbook.

6) When doing homework, always write down text section, page number, and problem number. If you choose to use scratch paper to brainstorm your answer, rewrite your finished procedure and answer in an orderly manner. It is important to show all work. Why?

7) Put an "X" or question mark, or use a highlighter or different color pen to mark problems you don't understand or are unsure of.

8) Write down hard to remember rules, formulas, and memory devices in an easy-to-find place: the front or back cover of your notebook, or a special section of your notebook.

9) Use 3 X 5 cards for flashcards of important ideas. Carry them with you so you can study them when you have a few spare minutes.

10) Try explaining your homework problems to someone else. This helps pinpoint the things you may be having trouble with. Explaining material to someone else is the best way to really learn something yourself.

11) Make use of the Learning Lab, Room 381. But don't expect tutors or anyone else to do the work for you. Math is a participant sport: you learn by doing it yourself, not by watching others.

12) Read a section ahead in the textbook. You will be better able to ask questions when the teacher explains that section.

13) Do a little math everyday. It's like exercise . . . a little everyday keeps you fit!

14) Keep a basic math textbook handy to use as a reference book. A good basic math textbook is as essential to the study of mathematics as a dictionary is to the study of other subjects.

STUDYING MATHEMATICS

TAKING TESTS

Before the test

1) Don't cram. Start studyng several days before the test.

2) Read over all your notes from class and textbook.

3) Make a summary of important ideas as you go over your notes.

4) Rework tricky problems or ones you had trouble with.

5) Make 3 x 5 cards for formulas and rules. Carry these flashcards with you so you can study them when you have a few extra minutes.

Taking the test

1) It is natural to feel uneasy about tests.

2) While you are waiting for the teacher to hand out the tests, practice relaxation techniques:
   a) close your eyes, and breathe slowly and deeply
   b) imagine yourself in a beautiful, relaxing place, such as the beach. Hear the water, feel the sun. Relax.
   c) calmly, slowly, talk to yourself positively: "I know the information well; I'm going to do a good job,"etc.

3) When you get the test,write down the formulas you needed to memorize right away. Then you won't have to worry about remembering them.

4) Read all directions carefully.

5) Start with problems you know how to do. Don't spend too much time on things you don't remember. Come back to them later - you may be able to do the work later.

6) Make sure your answers are reasonable and make sense.

When you get your test back

1) Congratulate yourself on everything you did right.

2) Don't kick yourself for making silly errors. Under pressure, everyone makes careless mistakes.

3) Most importantly, tests are learning experiences. Tests help you and the teacher determine what you have mastered, and what you still need to work on. Correct the errors you made on the text - learn from your mistakes. You often learn more from making a mistake than from getting things right all the time.

Real-Life Math
(Problems to Be Assigned As Homework)

1. Triple your favorite recipes and write down the new amounts. Cut your favorite recipe in half and write down the new amounts.

2. Compare the cost of different-sized containers of a product at the grocery store.

3. Calculate your mileage on the vehicle you drive.

4. Calculate the area of your living room. How many square yards of flooring would you need to purchase?

5. Go to a store and calculate the discount price of an item on sale for a certain percentage off.

6. If you receive a paycheck, calculate the percent of your paycheck that goes to federal tax, state tax, and social security.

7. Calculate the amount of tip to leave at a restaurant or hair salon.

8. Calculate how much interest you have to pay on a $182 charge bill for a month at 18% interest.

Introductions to Fractions

Vocabulary Review

Example: $\frac{3}{4}$ numerator represents a part of the whole.
denominator represents the number of parts the whole has been divided into.

Example: $\frac{10}{3}$ is called an improper fraction because the numerator is larger than the denominator. An improper fraction always represents a number larger than 1.

An improper fraction can be changed to its mixed number form by dividing the numerator by the denominator: $\frac{10}{3} = 3\ 1/3$.

Change these improper fractions to mixed numbers:

$\frac{12}{5} =$ $\frac{20}{9} =$ $\frac{14}{3} =$ $\frac{22}{7} =$

Example: 3 1/3 is called a mixed number because it includes a whole number and fraction. A mixed number can be changed to an improper fraction by multiplying the whole number by the denominator and adding the numerator: this number is the new numerator, and is placed over the original denominator: 3 1/3 = 10/3

Change these mixed numbers to their improper fraction forms:

4 2/5 = 2 3/8 =

7 4/9 = 5 3/4 =

Reducing fractions to the lowest terms is done by dividing both the numerator and the denominator by the same number.

Example: $\frac{4}{20} \quad \frac{4}{4} = \frac{1}{5}$ 1/5 is the lowest terms for 4/20.

Reduce these fractions to lowest terms:

$\frac{5}{15} =$ $\frac{12}{32} =$ $\frac{22}{28} =$ $\frac{9}{15} =$

Equivalent fractions can be made by multiplying both the numerator and the denominator by the same number.

Example: $\frac{3}{7} \times \frac{4}{4} = \frac{12}{28}$

Make equivalent fractions:

$\frac{2}{3} = \frac{\quad}{15}$ $\qquad$ $\frac{4}{7} = \frac{\quad}{42}$

$\frac{11}{12} = \frac{33}{\quad}$ $\qquad$ $\frac{9}{10} = \frac{45}{\quad}$

Adding Fractions

Add 3/5 and 4/5. 3/5 + 4/5 = 7/5 = 1 2/5

When you add with <u>like</u> denominators, the numerators are added together and put over the original denominator. The denominator doesn't change because the bars are still being divided into 5 parts.

Now add 3/4 and 2/5.

The bars are no longer being divided into the same number of pieces: we now have <u>unlike</u> denominators and a common denominator must be found before we can come up with an answer. Use your intuition to guess - estimate the answer.

Procedure for adding fractions: (denominators must be the same)

1)

2)

3)

<u>Estimate</u> answers first in these problems. Estimating involves using your own math intuition.

1) 2/3
<u>+ 1/5</u>

2) 7/8
<u>+ 6/7</u>

3) 1/2
4/5
<u>+ 2/3</u>

4) 12 3/7
<u>+ 9 5/7</u>

5) 4 5/6
<u>+ 3 1/5</u>

6) Make up a word problem from real life where you might add

fractions with unlike denominators.

Take a leap into the abstract:
Apply the procedure you learned for adding fractions with unlike denominators to these algebraic fractions.

7) $\begin{array}{r} 5/e \\ \underline{+7/f} \end{array}$ 8) $\begin{array}{r} 4/a \\ \underline{+\ 2/b} \end{array}$ 9) $\begin{array}{r} 8/x \\ \underline{+\ 1/y} \end{array}$ 10) $\begin{array}{r} 8/x \\ \underline{+\ 9/x} \end{array}$

What feelings arise when you work on problems 7, 8, 9, and 10?

Multiplying and Dividing Fractions

Important note: When multiplying with whole numbers, the result is a bigger number. But when multiplying whole numbers by fractions, the result is a smaller number. When dividing whole numbers by whole numbers, the result is a smaller number. But dividing whole numbers by fractions results in larger numbers.

1) What is half of 20?

Now change words to a mathematical expression. Notice the word "of" followed by a number always indicates multiplication.

Procedure for multiplying fractions:

2) What is a third of 15? . . . . . .

3) What is a fourth of a half?

4) What is three-fourths of 2 1/2? (Estimate first)

5) 3 3/5 x 2 6/7

Independent practice: replace "times sign with the word "of" when estimating these answers. If it helps, draw pictures. Estimate first.

1) 2/3 x 11

2) 10 x 1/4

3) 1/2 x 1/5

4) 1/3 x 1/6

5) 2 1/2 x 2 1/2

6) 5 1/4 x 2 4/7

7) 1/4 x 20

8) 3/8 x 4/9

Use what you know about multiplying number fractions to do these algebraic fractions:

9) $\frac{a}{b} \cdot \frac{c}{d}$

10) $\frac{5}{x} \cdot \frac{6}{y}$

11) $\frac{a}{b} \cdot \frac{3}{a}$

12) $\frac{b}{c} \cdot \frac{d}{b}$

Dividing Fractions

13) 4 ÷ 1/3 How is this read?

14) 2 1/2 ÷ 1/4 How is this read?

Procedure for dividing fractions:

In doing the next problems, reword them so it becomes clear what you are looking for in your answer. Estimate first.

15) $3 \div 1/2$

16) $9 \div 1/3$

17) $5/6 \div 1/3$

18) $1/6 \div 3$

19) $5\ 1/2 \div 3/4$

20) $4\ 3/8 \div 3\ 3/4$

21) $5/a \div 8/a$

22) $b/c \div x/y$

23) $\dfrac{3/4}{1/2}$ a <u>complex</u> fraction

Summary of Fraction Procedure

When adding and subtracting fractions:

When multiplying and dividing fractions:

"of" followed by a number means _____.

$\frac{1/2}{1/4}$ A complex fraction represents _____.

When multiplying a whole number by a fraction, the result is:

When dividing a whole number by a fraction, the result is:

Decimal Fractions

Decimals and fractions are simply different ways to write the same number. Fractions can be changed to decimals, decimals can be changed to fractions . . . . . you may use whichever form is most convenient.

Changing fractions to decimals:

Remember that all fractions represent the operation of division. Therefore, 3/4 means $3 \div 4$ (or $4\overline{)3}$).

Divide the numerator by the denominator to change fractions to decimals.

1) 3/4 =

2) 5/8 =

3) 1/3 =

4) 2/3 =

5) 2/5 =

6) 3/16 =

7) 5/22 =

8) 9/11 =

Every fraction becomes either a terminating or repeating decimal.

Changing decimals to fractions:

Remember, every decimal has an "unseen" denominator. .6 is 6/10; .75 is 75/100. Place the decimal (without decimal point) over the place value the decimal occupies, then reduce the fraction.

9) .8 =

10) .35 =

11) .725 =

12) .375 =

13) .65 =

14) .875 =

15) .75 =

16) .0125 =

Word Problems

Steps:

1) Read the problem through carefully. Determine what is being asked for . . . write down what is being asked for. In algebra, assign a letter name to the unknown.

2) Write down the known information, making sure to include labels. Note that if you need to add or subtract, labels need to be the same, so you may have to do some converting from one label to another. When multiplying or dividing, labels do not have to be the same. Draw pictures!

3) Determine what operation must be done (adding, subtracting, multiplying, dividing) that uses the known information to answer the question being asked. In algebra, this usually involves making up a formula or using a formula you have already been given.

4) Do the math necessary to come up with the solution. Estimate first.

5) Check your answer to make sure it answers the original question, and makes sense.

Key Words

Add:	Subtract:
sum	difference
plus	decrease
increase	reduce
combined	loss
altogether	less than
in all	remain
raise	dropped

Multiplication:	Division:
times	per
product	quotient
twice	each
area	split
volume	average
"of" followed by a number	how many piece in the whole

Selected Word Problems

1) If a crankcase cover has 10 evenly-spaced holes in it, and the distance from the hole on one end to the hole on the other end is 17 1/4", what is the center to center distance between the holes?

2) How many binding posts 1 7/8" long can be cut from a piece of brass rod 2' 3 1/2" long? Allow 1/8" waste for each cut.

3) How many holes spaced 1 7/16" center to center can be drilled in an angle iron 22 5/8" long, allowing 1 1/4" end distances on each end?

4) A machinist spends 2 1/4 hours at a lathe, 4 1/2 hours at the planer, and the rest of the day at the shaper. If the working day is 8 hours, and he makes $9.75 per hour, how much should he charge for the time spent at each machine?

5) A 7/8" bolt weighs .664 lb. How many such bolts are there in a keg of 250 lb.?

6) A 3 x 3 x 3/8 angle iron weighs 7.2 lb. per foot. Find the weight of a piece 12'3" long.

7) A shaft that should be 1 3/16" in diameter measures 1.317". How much is it oversize?

8) A recipe needs 2 1/4 C. flour. I only have a 3/4 C. measure. How many 3/4 C. of flour do I need to make 2 1/4 C?

9) How many grams of a chemical are needed to make 20 capsules that weigh 3/4 gram each?

10) One cereal costs $3.19 for 1 lb. 4 oz. Another cereal costs $2.79 for 22 oz. Which is the better buy?

11) Susan filled her car with gas, checking her odometer at 25,348.2 miles. Later that week, she filled her car again at 25,567.7 miles. The car took 11.2 gallons to be filled. What was her mileage? (mpg)

12) Sheldon's Shoe Store sold 54 pairs of shoes last week. 1/2 of the pairs sold were women's shoes, 1/3 were men's shoes, and the rest were children's shoes. How many pairs of children's shoes were sold in the week?

13) Luke drove 3 7/10 miles from his house to the grocery store, 4 7/10 miles from the grocery store to the drugstore, 2 miles from the drugstore to the bakery, and 6 3/10 miles from the bakery back to his house. How many miles did he drive?

14) Every week, 1/6 of Irma's salary is withheld for federal taxes, 1/8 is withheld for Social Security taxes, and 1/12 is withheld for state taxes. What fraction of Irma's salary is she allowed to take home?

15) Three out of every five people in Mayberry Township own pets. If 780 people in Mayberry Township own pets, how many people live in Mayberry Township?

16) 2 1/3 cups of brown rice makes four servings. If Bruce wants to make six servings of brown rice, how many cups of rice should he cook?

PERCENTS

The word "percent" means "divided by one hundred". Therefore, 16% actually means 16 divided by 100, or 16/100. Percents are the same as decimals and fractions: all three can be used interchangeably, depending on which is more convenient.

Express the following as percents, decimals, and fractions.

	%	decimal	fraction
1.)	40%	_____	_____
2.)	_____	.65	_____
3.)	_____	_____	3/8
4.)	_____	.80	_____
5.)	_____	_____	1/4
6.)	75%	_____	_____
7.)	_____	_____	1/3
8.)	_____	_____	2/3
9.)	12 1/2%	_____	_____
10.)	_____	.20	_____

When using percents in a problem, the percent is converted to either its fraction or decimal form.

Example: 25% of 60 is done as either:

a.) .25 X 60 = 15

or b.) 1/4 X 60 = 15

If you use the decimal form of the percent,note that you move the decimal point on the percent two places to the left.

Calculate these percents, using decimal and fraction form.

11) 20% of 150 =

12.) 30% of 210 =

13.) 33 1/3% of 24 =

14.) 10% of 560 =

15.) 15% of $28.50 =

16.) 25% of $48.00 =

17.) 5% of $70.00 =

PERCENTS

Percent problems follow this basic formula:

Base X Rate = Part

This formula may need to be rearranged depending on the information given. Use this triangle to help you decide what math to do:

Applied problems: Remember to estimate first.

1.) 25% of the math class got an "A" on their last test. If there are 48 students in the class, how many students got "A's"?

2.) Your restaurant bill was $28.00. You wish to leave a 15% tip. How much tip should you leave?

3.) A $35 dress is on sale for 20% off. What is the sale price of the dress? How much will you pay, including 5% sales tax?

4.) The gross income on a check was $1183.08. The amount taken out for federal taxes was $117.77, state taxes was $67.85, and social security (FICA) was $90.51. What percent of your gross pay went to federal tax, state tax,and FICA?

5.) You plan to buy a house that costs $62,000. You are required to pay a 20% down payment, and finance the remaining amount. How much will you have to finance?

6.) There is a 25% off sale on sweaters. What is the sale price of a sweater originally marked $38.95?

7.) You worked 40 hours at $7.20 an hour. Your employer takes 12% out of your gross pay for taxes, and 7.65% out for social security. How much is taken out for taxes?
How much is taken out for social security?
What is your net pay?

8.) Out of every 2,000 cars produced, 35 of them do not pass the road test and are therefore not marketable. What percent of the cars do not pass the road test?

9.) City employees got a 4 1/2% increase in wages this past year. If their old wage was $8.40 an hour, what is their new wage?

10.) Sally made $9.70 an hour last year, and makes $10.33 an hour this year. What percent raise did she get?

Calculators

Calculators are an extremely helpful tool in performing mathematical computations. Using calculators to add, subtract, multiply, or divide is not cheating: calculators are faster and (usually) more accurate than long-hand computations or mental arithmetic. You still do the thinking; the calculator only does what you tell it to do. You will find it very helpful to have a calculator with you to perform simple arithmetic operations in your everyday life: calculating your total grocery bill; figuring the amount of discount on sale items; figuring the sales tax due when buying taxable merchandise; checking your own restaurant bill and then figuring out how much tip to leave; balancing your check book, etc. You need not be embarrassed to use a calculator -- you will be protecting yourself as a consumer by checking the calculations of those you do business with. Math anxious persons particularly benefit from owning a calculator and using it properly so they can deal with numbers on a regular basis to help build confidence and increase skills.

When taking math courses at the technical or college level, calculators are a necessity, and you will be expected to use one for your homework. When you purchase a calculator, make sure it is a scientific calculator (the word "scientific" will appear on the calculator). A scientific calculator allows you to do trigonometry, statistics, and other calculations beyond the basic operations of adding, subtracting, multiplying, and dividing. You will eventually realize a calculator is a very important tool to help you in your math endeavors.

Calculator Usage

Every brand of calculator works a little differently. Make sure to keep the instruction booklet that comes with your calculator, and refer to it when you are unsure of what steps to use when doing a particular calculation.

This worksheet is based on using a TI-35 Plus.

---Turn the calculator on with the [ON/C] key. A zero should appear, and below and to the left should appear the word "DEG", meaning "degrees". If "RAD" or "GRAD" appears, press the [DRG] key until "DEG" appears.

If any other word appears on the lower part of the display, press [MODE] , then [1] to make sure your calculator is operating in decimal mode.

---Basic adding, subtracting, multiplying, and dividing are done by using the [+] [-] [X] [÷] keys. You must always press [=] to get the answer to a computation.

Try these:
1) 968.05 + 347.628
2) 47.5 - 15.65
3) 125 ÷ 1.5
4) 13.25 x 2.6

Notice, the calculator always puts the decimal point in the correct place in the answer.
A note about division: any division problem can be written in three different ways, as seen in these examples:

20 ÷ 5 can be written as $5\overline{)20}$ or 20/5. Fractions mean division.

Notice that "20" will be entered into the calculator first, no matter which way the original problem is stated.

---Pushing the [=] key twice will repeat the last operation you did.
Try this: 100 ÷ 5 = = _____. The calculator will keep dividing by 5 every time you push =.

Try these: 14 + 2 = =
20 - 3 = =
6 x 2 = =
So beware . . . press [=] only once to get your answer. If you press it twice, it repeats the last operation entered into the calculator.

---If you make a mistake when entering a number, pressing the [ON/C] key once will erase the last number or operation you entered. But again beware . . . pressing the [ON/C] twice will erase everything you have entered. Some calculators have a [CE] key (clear entry) to correct entry errors.
Try this, entering the last numeral incorrectly, then correcting your mistake: 14 + 8 + 12 + 6 + 5 (Answer should be 45)

---Order of operations. Several different operations may be seen in one mathematical expression, and you must know what to do first in order to come up with a correct answer.

Try this: 4 + 6 X 3 - 5 x 2 + 20 ÷ 2 =

The correct answer is 22. A scientific calculator automatically knows the correct order of operations, but simpler calculators do the operations as they are entered, and you might come up with 35, which is a wrong answer.

Remember to Please Excuse My Dear Aunt Sally, which is a mnemonic (memory) device to help you remember the correct order of operations,which are:

1) Parenthesis, brackets, or braces firstly
2) Exponents, powers or roots secondly
3) Multiplying and dividing, done left to right, thirdly
4) Adding and subtracting, done left to right, fourthly

$$4 + \underline{6 \times 3} - \underline{5 \times 2} + \underline{20 \div 2}$$
$$4 + 18 - 10 + 10 = 22$$

Note: Multiplying and Dividing are of equal order; Adding and subtracting are of equal order.
Use order of operations on the next examples:

1) 6 - 2 X (4 + 6) ÷ 5 + 9

2) 16 + (8 - 3 X 2) - 2

3) $\dfrac{42-8 \times (17.2 + 9.6)}{5.8 + 9 \times 1.7}$

Steps for complex fractions:
1) Calculate numerator
2) Calculate denominator
3) Divide numerator by denominator

In the above examples, parenthesis are used. Your calculator has parenthesis keys, so you can enter the problem as it is written, using parenthesis keys.

---All scientific calculators have a "memory". You can put a number into memory to save it for future use. If you wanted to put the number 30 in store, press 30 [STO] . The number is now stored in your calculator, waiting to be used. Note, when a number is in memory, an "M" appears on the upper left corner of the display. When you turn your calculator off, then back on again, the number remains in memory. To use the number in calculation, press [RCL] (for recall), and the number appears on the display.

Memory is helpful in problems like this:

$$\frac{(42 \times 50) + (15 - 10)}{(32 + 6) \times 5}$$

Calculate the denominator first, and store the answer. Then calculate the numerator, then divide the numerator by [RCL] ,and press [=] to complete the operation.

Memory is also useful when you have to use the same number again and again:

$X^2 + X - 40 + X^2 - 30$ when $X = 5$

Put "5" in memory, and calculate, using the [RCL] key whenever you get to an "X".

---The "change sign" key, [+/-] , is used to enter negative numbers into your calculator. To enter -6, press 6 [+/-] . This key is useful when doing operations with signed numbers.

-6 X -5 = $\frac{-40}{5}$ = -12 + -7 = +10- -10=

---In problems involving circles the number "π" (pi) is used. The approximate value of π is 3.14. There is a "π" key on your calculator. Notice that π is written above the [EXP] key on a TI-35 Plus. Anything written above a key is accessed by using the [2nd] or [INV] key in the upper left corner. To use [π] ,push [2nd] , then [EXP] , and π will be displayed to 9 decimal places. Use the [π] key to calculate the following:

The circumference of a circle is found by multiplying π times the diameter of the circle: $C = \pi d$
Calculate the circumference when d = 15 inches

---The square and square root key are often used in basic geometry and algebra.

Squaring a number means multiplying it times itself. 3^2, read "three squared", means 3 x 3, or 9. To square a number on the calculator, use the [x^2] key. You do not need to press [=] when using the [x^2] key.

Square these numbers:

5^2 =____ 10^2 =____ 18^2 =____ 25^2 =____

---Finding the square root is the opposite procedure of squaring. Finding the square root of 16, written $\sqrt{16}$, means finding what number you multiply times itself to get 16. The answer is 4. The square root key is above the [x^2] key, so to find the square root of 16, press 16 [2nd] [x^2] , and 4 will appear.

Try these:

$\sqrt{25}$ = $\sqrt{36}$ = $\sqrt{75}$ =

$\sqrt{144}$ = $\sqrt{180}$ =

---Exponents are also frequently used. Exponents are small numbers written above and to the right of a number. 4^2 has an exponent of "2". An exponent always indicates how many times a number is multiplied times itself. 4^2 means 4 x 4; 4^3 means 4 x 4 x 4; 4^4 means 4 x 4 x 4 x 4. Exponents can be done on a calculator using the [y^x] key. To find 4^3 , press 4 [y^x] 3 [=] to get 64.

Try these:

5^3 = 5^7 = 6^4 = 20^3 =

ANSWERS TO WORKBOOK PROBLEMS

p. 46

Improper to mixed:

$\frac{12}{5} = 2\frac{2}{5}$ $\quad \frac{20}{9} = 2\frac{2}{9}$ $\quad \frac{14}{3} = 4\frac{2}{3}$ $\quad \frac{22}{7} = 3\frac{1}{7}$

Mixed to improper:

$4\frac{2}{5} = \frac{22}{5}$ $\quad 2\frac{3}{8} = \frac{19}{8}$ $\quad 7\frac{4}{9} = \frac{67}{9}$ $\quad 5\frac{3}{4} = \frac{23}{4}$

Reduce:

$\frac{5}{15} = \frac{1}{3}$ $\quad \frac{12}{32} = \frac{3}{8}$ $\quad \frac{22}{28} = \frac{11}{14}$ $\quad \frac{9}{15} = \frac{3}{5}$

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Equivalent fractions:

$\frac{2}{3} = \frac{10}{15}$ $\quad \frac{4}{7} = \frac{24}{42}$ $\quad \frac{11}{12} = \frac{33}{36}$ $\quad \frac{9}{10} = \frac{45}{50}$

p. 48

Procedure for adding fractions:

1) Find a common denominator my multiplying the original demoninators times each other.
2) Change each fraction to an equivalent fraction having the common denominator. (Remember, both numerator and denominator must be multiplied by the same number to get equivalent fractions.)
3) Add the numerators and place over the common denominator.

Addition problems:

1) $\frac{13}{15}$ $\quad$ 2) $1\frac{41}{56}$ $\quad$ 3) $1\frac{29}{39}$ $\quad$ 4) $21\frac{8}{7} = 22\frac{1}{7}$

5) $7\frac{31}{30} = 8\frac{1}{30}$

p. 49

7) $\frac{5f + 7e}{ef}$ $\quad$ 8) $\frac{4b + 2a}{ab}$ $\quad$ 9) $\frac{8y + 1x}{xy}$ $\quad$ 10) $\frac{17}{x}$

P. 50

1) $\frac{1}{2} \times 20 = 10$

Procedure: Change whole numbers to fractions by putting a "1" under the whole number. Then multiply numerator times numerator, then denominator times denominator. Finally, divide numerator by denominator to get final answer.

2) 5 3) $\frac{1}{8}$ 4) $1\frac{7}{8}$ 5) $10\frac{2}{7}$

Independent Practice:

1) $7\frac{1}{3}$ 2) $2\frac{1}{2}$ 3) $\frac{1}{10}$

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4) $\frac{1}{18}$ 5) $6\frac{1}{4}$ 6) $13\frac{1}{2}$ 7) 5 8) $\frac{1}{6}$

9) $\frac{ac}{bd}$ 10) $\frac{30}{xy}$ 11) $\frac{3}{b}$ 12) $\frac{d}{c}$

13) 12 14) 10

Procedure: Change mixed numbers to improper fractions. Change sign to multiply, invert second number, then multiply.

p. 52

15) 6 16) 27 17) $2\frac{1}{2}$ 18) $\frac{1}{18}$ 19) $7\frac{1}{3}$

20) $1\frac{1}{6}$ 21) $\frac{5}{8}$ 22) $\frac{by}{cx}$ 23) $1\frac{1}{2}$

p. 53

When adding fractions:

1) Common denominators needed
2) Keep mixed numbers

When multiplying and dividing fractions:

1) Don't need common denominators
2) Change mixed numbers to improper fraction.

p. 54

1) .75 2) .625 3) .3333.... = $\overline{.3}$ 4) .6666.... = $\overline{.6}$ 5) .4 6) .1875 7) .22727.... = $.2\overline{27}$

8) .8181.... = $\overline{.81}$

p. 55

9) $\frac{4}{5}$ 10) $\frac{7}{20}$ 11) $\frac{29}{40}$ 12) $\frac{3}{8}$ 13) $\frac{13}{20}$ 14) $\frac{7}{8}$

15) $\frac{3}{4}$ 16) $\frac{1}{80}$

p. 57

1) 1 $\frac{11}{12}$" 2) 13 3) 15 4) $21.94 lathe
$43.88 planer
$12.19 shaper

5) 376 6) 88.2 lb

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7) .1295 inches 8) 3 9) 15 grams 10) the 22 oz box

11) 19.6 mpg 12) 9

p. 59

13) 16 $\frac{7}{10}$ 14) $\frac{5}{8}$ 15) 1300 16) 3.5

p. 60

	%	decimal	fraction
1)		.40	2/5
2)	65%		13/20
3)	37.5%	.375	
4)	80%		4/5
5)	25%	.25	
6)		.75	3/4
7)	33 1/3%	.333...	
8)	66 2/3%	.666...	
9)		.125	1/8
10)	20%		1/5

p. 61

11) 30 12) 63 13) 8 14) 56 15) $4.28

16) $12.00 17) $3.50

p. 62

1) 12 2) $4.20 3) $28 & $29.40 4) Federal 9.95%
State 5.74%
FICA 7.65%

5) $49,600

p. 63

6) $29.21 7) $34.56
$22.03
$231.41 8) 1.75% 9) $8.78 10) 6.5%

NONTRADITIONAL EXPLORATION

NONTRADITIONAL EXPLORATION

This portion of the workshop is often the most rewarding for participants. Two hours per session is devoted to hands-on exploration of nontraditional programs. This component of the workshop is also the most versatile, in that BTC has approximately 24 programs which are considered nontraditional. Each workshop can only explore 6 or 7 programs. Care is taken to provide a variety of experiences which will assist you in making more informed career choices.

Instructors and students will provide information to help you become more familiar with each program and the nontraditional career it prepares you for. Participants are encouraged to ask questions concerning required skills, difficulty of the program, job potential, wage potential, etc.

The following pages provide descriptions of each of the nontraditonal programs at BTC which are presented at Nontraditional Options Workshops. Remember that only 6 or 7 programs will be included in each workshop. Information on addItional programs is provided so that you may include them in your decision making process. Participants are encouraged and invited to explore any of the nontraditional programs more thoroughly by "shadowing" another student or sitting in on classes. Shadowing experiences can be scheduled through the Sex Equity Program (757-7752) or the Counseling Center (757-7668).

The program descriptions which follow will include general

information on skills, careers, required tools, program length, etc.; as well as information pertinent to workshop participation, such as what to wear for the presentation and relevant safety issues. (Additional information on individual programs is available at the Information Desk, Career Center, Sex Equity Office and Division Office.)

PROGRAM DESCRIPTIONS

AUTO BODY

Description: This one year vocational program trains students to straighten and refinish damaged bodies and parts of automobiles and light trucks.

Responsibilities: Weld body metal using modern welding equipment, repair plastic and fiberglass body parts; perform unibody repair; straighten and bring frames into line using hydraulic jacks and pulling devices; fill imperfections; refinish repaired surfaces; learn to mix and apply the proper color paint and industrial finishes; paint vehicles and industrial equipment; make auto glass repairs; read and interpret service manuals.

Job Potential: Auto Body Repairer

Related Jobs: Auto Body Repairer Helper, Auto Painter, Auto Repair Service Salesperson, Parts Counterperson, Air Conditioning Repairer, Auto Electric Serviceperson, Front End and Alignment Serviceperson, Automobile Assembly

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Learn to Write a Damage Report
Watch Slide Series
Discussions on Auto Body as a Career
Shop Tour
Observe Auto Body Repair Work

Safety Issues: **Eye Protection Required**

Clothing: Work attire
Protective Smock

AUTO SERVICING/AUTO MECHANIC

Description: One year Auto Servicing and two year Auto Mechanics vocational programs teach students automotive repair and maintenance.

Responsibilities: Students learn to: use hand and machine tools; conduct diagnostic testing on engines, cooling systems, carburetors, electrical systems; operate computerized equipment; test the operation of transmissions, steering gears and brakes; plan repairs; prepare records and costs; fill out estimates, etc.

Job Potential: Auto and Light Truck Mechanic

Related Jobs: Auto Mechanic Helper, Service Mechanic, Transmission Mechanic, Service Manager

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Demonstration and Participation in:
Inspection of Brake, Fluids, Belts, and Hoses
Safety Inspection
Programming Diagnostic Computer

Safety Issues: **Eye Protection Required**

Clothing: Appropriate Work Clothing Suggested
Protective Smocks Available

BUSINESS EQUIPMENT SERVICE TECHNICIAN

Description: This one year vocational program prepares Business Equipment Service Technician students to service equipment such as manual, electric and electronic typewriters, calculators, copiers.

Responsibilities: Must have knowledge and technical skills to recognize and correct or prevent problems that cause malfunction or breakdowns on office equipment; inspections; servicing; maintenance.

Job Potential: Office Machine Service Technician

Related Jobs: Office Machine Salesperson; PC Board Troubleshooter; Parts Inventory Maintenance Person

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Lecture
Discussion of Program and Job Potential
Introduction to Volt Ohmmeters
Hands-On Exploration

Safety Issues: **Eye Protection Required**

Clothing: Appropriate Work Clothing Suggested
Protective Smocks Available

ELECTRIC POWER DISTRIBUTION

Description: This one year vocational diploma program prepares a student to advance to an electric lineworker apprenticeship and related occupations.

Responsibilities: Students learn: to properly climb poles and install line hardware and equipment; safety procedures; motor vehicle operation and maintenance; application of rubber protective equipment; use of hot sticks; introductory electricity.

Job Potential: Lineworker Apprentice

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Lecture
Hands-On Exploration of tools and Equipment
Film

Safety Issues: None

Clothing: General

MACHINE MAINTENANCE

Description: This one year vocational diploma program teaches students: to repair and maintain machinery and other equipment, to use machine tools to make metal parts, and to plan and carry through all operations needed in turning out machine parts.

Responsibilities: Students learn: to select tools and required materials to make repairs; to plan cutting and finishing operations according to printed specifications; to use precision measurement instruments; to practice preventative maintenance.

Job Potential: Maintenance Mechanic/Machinist; Shop Mechanic; Machine Repairperson; Machinist/Machine Operator

Related Jobs: Production Machine Operator; Tape Control Machine Operator; Machine Shop Foreman; Tool and Die Maker; Job Sitter; NC Programmer; Tool Designer

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Discussion
Demonstration of CAM and/or CNC
Blueprint Demonstration
Hands-On training in Power Tool Usage
Hands-On training of Hand Tool Usage

Safety Issues: **Eye Protection Required**

Clothing: Appropriate Work Clothing Suggested
Protective Smock Available

MACHINE TOOL OPERATOR

Description: Students in this one year vocational diploma program learn to set up and operate lathes, drill presses, milling machines, grinders, computer numerical equipment, and special purpose machines to shape metal work pieces to close specifications.

Responsibilities: Students learn: to use cutting tools, tool holders, drilling and milling vices, hydraulic vices, strap clamps, and precision measuring instruments; to operate CNC and CAM equipment.

Job Potential: Machine Tool Operator

Related Jobs: Machine Feeder; Punch Press Operator; Do-All-Saw Operator; Machine Set-Up Operator; Machinist; Machine Shop Foreperson

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Discussion
Demonstration of CAM and/or CNC
Blueprint Demonstration
Hands-On training in Power Tool Usage
Hands-On training in Hand Tool Usage

Safety Issues: **Eye Protection Required**

Clothing: Appropriate Work Clothing Suggested
Protective Smock Available

WELDING

Description: This one year vocational diploma program is designed to develop manipulative skills in the use of welding equipment and to provide an understanding of problems involved in common types of welding fabrication and repair.

Responsibilities: Students learn: blueprint reading; to set up acetylene and other fuel gases for cutting; to clean work pieces using wire brushes; to operate portable grinders and files; to cut metal plates or structured shapes using flame-cutting apparatus or hand torches; theory of the welding process; the skills necessary in welding joints and welds in all positions; six methods of welding (gas, gas-tungston arc, metal cored, gas metal arc, shielded metal arc, and fixed cored welding).

Potential Jobs: Welder

Related Jobs: Welder Helper, Tacker, Production Line Welder, Fabrication; Machine Maintenance Helper-Welding

Tools and Safety Equipment Required

WORKSHOP ACTIVIES:

Set up and operate welding and fuel gas cutting equipment
Students will be introduced to the theory and application of six welding processes through hands-on exploration.
Hands-On introduction to: grinders, sanders, shear, measuring tools

Safety Issues: **Eye Protection Required**
Welding Gloves Required
Welding Mask Required
Smocks Required

Clothing: Appropriate Protective Clothing Required

AIRCRAFT ELECTRONICS

Description: This two year vocational diploma program provides a thorough understanding of the fundamentals of electricity and electronics, and includes preparation for taking the Federal Communications Commissions tests as well as "hands-on" line work in the FAA approved Repair Station No. 3479, Radio Class 1, 2, 3, at the Rock County Airport.

Potential Jobs: Aircraft Electronics Technician
Electronics Inspector, Public Service
Two-Way Radio Technician, Radio/
Television Electronic Technician,
Electronic Repairperson.

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Lecture
Discussion of Program and Occupations
Hands-on Exploration
Tour

Safety Issues: **Eye Protection Required**

Clothing: Appropriate Work Clothing Suggested

AIRFRAME AND POWERPLANT MECHANIC

Description: Graduates of this two year vocational diploma program are qualified to take the FFA written, oral and practical tests, which are required for licensing as airframe and powerplant mechanics. The program offers training on the same airworthy aircraft and engines as found in the field. Students are required to do work of the highest airworthy standards. Maturity and ability to do precision work are essential for success in this program.

Responsibilities: Students learn: to make decisions on the airworthiness of aircraft structures, systems, engines, propellers and components after performing inspections, repairs, alterations, and maintenance on airworthy aircraft engines and components. Students are trained to work on piston and jet powered aircraft, helicopters, piston and turbine engines.

Job Potential: Aircraft Mechanic, Aviation Maintenance Technician

Related Jobs: Aircraft and Engine Mechanic, Apprentice or Helper Repairperson

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Lecture
Discussion of Program and Occupations
Hands-on Exploration
Tour

Safety Issues: **Eye Protection Required**

Clothing: Appropriate Work Clothing Suggested

ELECTRO-MECHANICAL TECHNICIAN

Description: An Electro-Mechanical Technician who graduates from this two year Associate Degree Program fabricates, tests, analyzes, adjusts, repairs, and maintains various machinery and devices that are electronic and mechanical in nature.

Responsibilities: Students learn the essentials of electronics, hydraulics, pneumatics, motors, robots and mechanical devices. They develop skill and knowledge in operating specialized electronic and mechanical test instruments.

Job Potential: Electro-Mechanical Technician, Robotics Technician, Automation Technician.

Related Jobs: Electro-Mechanical Maintenance Technician, Machine Repairer, Electronic Assembler and Tester, Instrument Mechanic, Electric Equipment Repairer, Hydraulic/Pneumatic System Technician

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Lecture
Discussion of Program and Occupations
Hands-on Exploration of Electronic Equipment

Safety Issues: **Eye Protection Required**

Clothing: Appropriate Work Clothing Suggested.

ELECTRONIC TECHNOLOGY

Description: Graduates of this two year Associate Degree Program perform a variety of duties in the manufacture of electronic equipment, research and development of new equipment or the repair and maintenance of existing equipment.

Responsibilities: Electronic Technicians test and inspect electronic equipment on the assembly lines; test, adjust and repair completed equipment; build experimental models of equipment; make complex tests of newly developed instruments called Systems; inspect equipment while in use; perform preventive maintenance; troubleshoot and repair or replace defective parts; read diagrams and follow mathematical formulas in diagnosing problems.

Job Potential: Electronic Technician, Electronic Systems Technician, Computer/Digital Systems Technician, Electronics Engineering Assistant, Laboratory Service Technician.

Related Jobs: Electronic Print Circuit Board/Layout Drafter, Instrumentation Technician, Electronic Systems Analyzer, Electronic Maintenance Supervisor, Technical Writer.

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Lecture/AV Presentation of Opportunities in Electronics. Hands-On Component using basic electronic tools and equipment.

Safety Issues: None

Clothing: General

MECHANICAL DESIGN

Description: The graduate of this two year Associate Degree Program is a trained member of the engineering team engaged in the design, planning, development and testing of mechanical components and machines. Training for this career requires technical skill of drafting and knowledge of scientific and engineering principles as related to and applied to design.

Responsibilities: Students learn: to apply theory and principles of mechanical engineering to the design, development, and testing of machinery and mechanical equipment; to review project instructions, contracts, and specifications to determine test values, procedures and component functions; equipment testing; redesign of components; drawing, preparation and development for fabrication and assembly of new or modified mechanical components.

Job Potential: Mechanical Design Technician, Mechanical Draftsperson

Related Jobs: Industrial Engineering Assistant, Mechanical Design Technician/Supervisor; Tool and Die Designer; Tool Designer/ Engineer; Technical Illustrator; Engineering/Manufacturing.

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Discussion of program, employment outlook, and professional opportunities. Demonstration and Hands-On exploration of CAD

Safety Issues: None

Clothing: General

THE FOLLOWING AGRICULTURAL PROGRAMS OFFERED AT THE BTC NORTH CAMPUS ARE COMBINED FOR ONE WORKSHOP SESSION.

TRUCK MECHANIC

Description: This one year Vocational Diploma Program provides training in job entry skills, heavy duty truck chasis, truck-tractor chasis and trailer chasis repair. This program can be used as the first year of the Diesel Heavy Equipment Program.

Responsibilities: Students learn theory of operation and actual repair of heavy duty braking systems, drive trains, steering, syspension, electrical systems, fuel systems, hydraulic systems, etc.

Job Potential: Brake Repairer, Front End Mechanic, Transmission Mechanic, Brake Adjuster, Air Conditioning Mechanic

Tool and Safety Equipment Required

AGRICULTURAL EQUIPMENT

Description: Students work in a modern and technical training facility. Whether they wish to return to the farm, work for an implement dealership, or work on industrial implements, knowledge of maintenance, diagnosis and repair of today's agriculture and industrial machinery is a must to insure farm and business profit. This program can be used as the first year of the Diesel Heavy Equipment Mechanic Program.

Responsibilities: Students learn: power and mechanical operating systems of tractors, lift trucks, combines, forager harvesting, planting, primary and secondary tillage and loading equipment.

Job Potential: Farm Equipment, Servicing Mechanic, Industrial Equipment Service Mechanic, Tractor Mechanic, etc.

Tool and Safety Equipment Required:

DIESEL HEAVY EQUIPMENT MECHANIC

Description: This two year vocational diploma program provides training in job entry skills for diesel engine repair in heavy truck construction/ industrial, farm, automotive, gen-set, and light marine occupation.

Responsibilities: Students learn: diesel engineer principles; diesel engineer overhaul, diesel fuel systems; heavy duty hydraulic and electrial systems; diesel engine auxilary systems.

Tools and Safety Equipment Required

WORKSHOP ACTIVITIES:

Tour
Lecture
Hands-on Exploration of Starters, Alternators, Freon and Airconditioning
Discussion of Programs and Occupations

Safety Issues: **Eye Protection Required**

Clothing: Appropriate Work Clothing Suggested
Protective smocks available

APPRENTICESHIP PROGRAMS

Apprenticeship Training Programs are offered at BTC in the following occupations: Carpentry, Electrician; Machinist/Tool and Die; Steamfitter; Plumber.

WORKSHOP ACTIVITIES:

Discussion on Apprenticeships - The Process
Two videos on: Women in the Trades
Employment Outlook/Wages/Skills

Safety Issues: None

Clothing: No Restrictions